

Application No. 10/668,387

Reply to Office Action of : February 19, 2010

**IN THE CLAIMS**

1. (Currently Amended) A method for modulating the morphology of softwood fibers comprising the steps of:

subjecting pulp containing softwood fibers to a solution containing transitional metal ions at a concentration from about 0.002% to about 0.1% by weight based on pulp and a peroxide at a pH between about 1 and about 9 for a time of from about 10 minutes to about 10 hours at a temperature from about 40 to 120°C to cause oxidative degradation of cellulose of such softwood fibers, and

subjecting the treated fibers to a refining treatment to form refined paper making fibers,

wherein said method reduces fiber suspension viscosity.

2. Canceled

3. (Previously Presented) The method of Claim 1 wherein said transitional metal ions are selected from iron, copper and combinations thereof.

4. (Original) The method of Claim 1 wherein said pH is between about 3 and about 7.

5.-6. Canceled

7. (Previously Presented) The method of Claim 1 wherein said peroxide is present in said solution at a concentration between about 0.2% and about 5% based on pulp.

8. Canceled

9. (Previously Presented) The method of Claim 1 wherein said softwood fibers are subjected to said solution for a time sufficient to substantially act on at least the cellulose and hemi-cellulose of the pulp, causing oxidation and oxidative degradation of cellulose fibers.

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10.-19. Canceled

20. (Previously Presented) The method of claim 1 wherein said softwood fibers are Kraft fibers.

21. (Previously Presented) The method of claim 1 wherein said softwood fibers are Southern Pine fibers.

22. (Previously Presented) The method of claim 1 wherein said softwood fibers are bleached fibers.

23. (Previously Presented) The method of claim 1 wherein said softwood fibers are bleached Kraft fibers.

24. (Previously Presented) The method of claim 1 wherein said refined paper making fibers exhibit a substantially shorter fiber length and distribution and enhanced fiber collapsibility than prior to said refining treatment.

25. (Previously Presented) The method of claim 1 wherein said refined paper making fibers exhibit paper making properties substantially functionally equivalent to hardwood pulp papermaking properties.

26. (Previously Presented) The method of claim 1 wherein said subjecting step comprises treating said pulp containing softwood fibers with said composition comprising peroxide and transitional metal ions.

27. (Previously Presented) The method of claim 4 wherein said transitional metal ions are selected from the group consisting of iron, copper and combinations thereof.

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28. (Previously Presented) The method of Claim 1, wherein said pH is between about 1 and about 7.
29. (Previously Presented) The method according to Claim 1, further comprising adding a transitional metal ion to peroxide.
30. (Previously Presented) The method according to Claim 29, further comprising: adding a transitional metal ion to peroxide in the presence of the pulp.
31. (Currently Amended) The method according to Claim 30, further comprising: adding between about 0.002% and about 0.1% of a transitional metal ion based on pulp to peroxide in the presence of the pulp.
32. (Currently Amended) The method according to Claim 29, further comprising: adding between about 0.002% and about 0.1% of a transitional metal ion based on pulp.
33. (Previously Presented) A pulp comprising between about 50% and 90% hardwood pulp and the remainder being softwood pulp which has been subjected to the method according to claim 1.
34. (Currently Amended) A method for modulating the morphology of softwood fibers, comprising:  
adding a transitional metal ion at a concentration from about 0.002% to about 0.1% by weight based on pulp to a solution comprising peroxide to form a metal-ion activated peroxide;  
contacting pulp including softwood fibers with the metal ion-activated peroxide at a pH between about 1 and about 9 for a time of from about 10 minutes to about 10 hours at a temperature from about 40 to 120°C to cause oxidative degradation of cellulose of such softwood fibers, and  
refining the treated fibers to form fibers having a modified morphology,

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wherein said method reduces fiber suspension viscosity.

35. Canceled

36. (Previously Presented) The method according to Claim 34, wherein the transitional metal ion is a metal salt.

37. Canceled

38. (Previously Presented) The method according to Claim 34, wherein said pH is between about 1 and about 7.

39. (Previously Presented) The method according to Claim 1, wherein said pulp further comprises hardwood fibers.

40. (Previously Presented) The method according to Claim 34, wherein said transitional metal ion is selected from iron, copper and mixtures thereof.

41. (Previously Presented) The method according to Claim 40, wherein said pulp comprises between about 50% and about 90% softwood fibers and between about 10% and about 50% hardwood fibers.